

THE PROOF OF THE PUDDING: THE PRESENTATION AND PROOF OF EXPERT EVIDENCE IN SOUTH AFRICA

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INTRODUCTION

Imagine, as one may well imagine at this time of the day, a chocolate mousse, dark and delectable, or a tempting tiramasu or a perfect pavlova. How are you going to decide which is best? Yes, indeed the actual presentation of the puddings may influence your choice, but to be able to make an informed choice, you would need to taste them. Do you have to make the choice according to your own taste, or do you have to decide which should go best with your menu for your dinner party? If you have to decide which is best, you would have to be able to rank them in relation to other mousses, tiramasus or pavlovas. You need to know the ingredients, and for a professional decision you would need some knowledge of the art of cooking. Proof¹ in the art of cooking, science, and also in law² depends on the quantum and quality of evidence or data sufficient to support a conclusion. Loevinger concludes that “[p]roof ultimately depends on the ability of the human mind to make appropriate and useful distinctions and connections among data or items of evidence”.³

Fact-finders, in the context of expert evidence, are not only faced with the task of determining which elements of expert evidence must be disregarded as irrelevant or unimportant, but must also find means of determining the significance or weight that should be attached to expert evidence in any given case.

Barnes and Edge⁴ describe the dilemma:

“The normative question of how expert knowledge is best assessed, and how experts themselves are best evaluated and kept under a modicum of control, raises such intractable and viciously circular problems as to strangle speech.”

The *ratio* for the introduction of expert evidence is the possibility that it could assist the trier of fact in deciding the issues at stake.⁵ Even though trial by jury

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¹ The *Oxford English Dictionary* defines proof as “that which makes good or proves a statement; evidence sufficient (or contributing) to establish a fact or produce belief in the certainty of something. *Webster’s Third International Dictionary* defines proof as “the cogency of evidence or of demonstrated relationship that compels acceptance by the mind of a truth or fact.”

² The difference between the standards of proof in law and the so-called “hard” sciences lies in the *nature* and measurement of the proof acceptable to the discipline. Evidence that lawyers rely on as means of proof are usually in the form of an account by witnesses expressed in verbal terms, while the data produced by the usual techniques of the “hard sciences”, measuring and counting, is usually expressed numerically.

³ L. Loevinger, “Standards of proof in science and law”, (1992) 32 *Jurimetrics Journal* 323.

⁴ B. Barnes and D. Edge (eds.) *Science in Context*, 1982, 33.

⁵ *S v. Van As* 1991 2 SASV 74 (W) 86 c–e. See also generally F.E. Raitt, “A new criterion for the admissibility of scientific evidence: the metamorphosis of helpfulness” in H. Reece (ed.), *Law and Science. Current Legal Issues*, 1998, 153.

has been abolished in South Africa,⁶ the essential structure of a system intended for a jury as fact-finder is followed.⁷ The main difference between South African and other common law systems is that the fact-finder is a legally trained person, who in the High Court in criminal matters sits with legally trained assessors. Although the tribunal of fact is not bound by the views offered by the expert,⁸ the dilemma is, who is to assist the tribunal of fact in evaluating this very evidence, which has been introduced to assist it? In the context of adversarial litigation, there exists the additional problem associated with the assessment of conflicting expert evidence.⁹ Traditionally, common law systems have provided judges “with few tools to help them evaluate the assertions of experts”.¹⁰ This has resulted in South African judges shying away from expert evidence, preferring rather to decide the matter on the other evidence available.

The exponential growth of the fields in which expert evidence can be proffered has also resulted in expansion in the areas of complexity in which lay triers of fact, be they professional judges, legally trained assessors or jurors, have to gauge the probative value of such expert evidence. The problems associated with what Freckelton calls the “knowledge gap”,¹¹ carry with them the inherent danger that judicial decision-makers engage in deliberations and come to conclusions on the basis of evidence that they do not fully comprehend.¹² Presentation of scientific data often relies on statistical reasoning which is either counter-intuitive or difficult to fathom for non-scientists.¹³ Traditional approaches to weighing up evidence, i.e. witness credibility, demeanour, etc., may flounder in the sea of expertise as these factors are inadequate to gauge the reliability and validity of specialized forensic evidence. Although the recommendations made in this article are mainly for South Africa, some of them may be useful also in other jurisdictions.

The article reviews ways in which the probative value of expert evidence can be assessed commensurate with the demands of the different disciplines involved. The first section sets out some of the potential problems that may be encountered in the context of expert evidence. The second section argues for appropriate

⁶ S. 7 of the Abolition of Juries Act 34 of 1969.

⁷ In a trial before a superior court in matters where life imprisonment or substantial periods of imprisonment are possible punishments, a judge is likely to sit with two assessors. (See s. 146 of the Criminal Procedure Act 51 of 1977). A magistrate may also under certain circumstances sit with assessors (s. 93 ter (3)) of Magistrates' Courts Act 32 of 1944.

⁸ In *Davie v. Magistrates of Edinburgh* [1953] SC 34 the *locus classicus* on the fact that a judge or jury is not bound by the views of an expert, Lord President Cooper held: “Expert witnesses, however skilled or eminent, can give no more than evidence. They cannot usurp the function of the jury or Judge sitting as a jury, any more than a technical assessor can substitute his advice for the judgment of the court. Their duty is to furnish the Judge or jury with the necessary scientific criteria for testing the accuracy of their conclusions so as to enable the application of their criteria to the facts proved in evidence. The scientific opinion, if intelligible, convincing and tested becomes a factor (and often an important factor) for consideration along with the whole other evidence in the case, but the decision is for the Judge and jury.” However, Kriegler, J. in *S v. M* 1991 SACR 91 (T) emphasized the fact that “the wise judicial officer does not lightly reject expert evidence on matters falling within the purview of the expert witness field . . . One does not reject such evidence readily where the expert has furnished his opinions—and the foundational reasons therefore in a satisfactory manner” (99h–100c).

⁹ L. Hand, “Historical and practical considerations regarding expert testimony”, (1901–02) 15 *Harvard L. Rev.* 56.

¹⁰ M.J. Saks, “The aftermath of *Daubert*: an evolving jurisprudence of expert evidence”, (2000) 40 *Jurimetrics* 230.

¹¹ I. Freckelton, “Court Experts, Assessors and the Public Interest”, (1986) 8 *International Journal of Law and Psychiatry* 161.

¹² *Holtzhausen v. Roodt* 1997 (4) SA 766 (WLD).

¹³ K. Foster and P. Huber, *Judging Science*, 1997, 250.

judicial education that could effectively assist decision-makers in the assessment of expert evidence. Guidelines which can assist judges and assessors in the process of evaluating expert evidence are also discussed in the third section. Assessing the probative value of expert evidence in conjunction with other evidence is the topic of the fourth section.

PROOF AND PROBABILITIES

In common law systems, the burden of proof is the obligation imposed by the law of evidence on a party seeking to prove a fact. The party must adduce sufficient evidence to discharge the burden and have the fact found proven beyond reasonable doubt.¹⁴ How decisions are made concerning proof to the standard of beyond reasonable doubt remains relatively unexplored.¹⁵ Hoffman and Zeffert contend that in the South African context “no explanation is necessary, because for judges and magistrates the standard of proof is a matter of experience and intuition rather than analysis”.¹⁶

In fact-finding, judicial tribunals who are confronted with two incompatible assertions and unable to decide which of them is true, will base their decision on the more probable one.¹⁷ The concept of probability is elusive at best, as is indicated by the fact that many dictionaries merely define it in terms of an equivalent synonym.¹⁸ Lawyers dealing with questions of fact¹⁹ as well as forensic scientists giving expert evidence,²⁰ need to make judgments about probabilities. Depending on the context, different theories of probability may be at stake.²¹

¹⁴ This onus should be compared with the civil standard, viz. proof on a balance of probabilities.

¹⁵ J. Newman, “Beyond reasonable doubt”, (1993) 68 *New York University Law Review* 979, Note, “Reasonable doubt: an argument against definition”, (1995) 108 *Harvard L Rev.*, 1955; S. Sundby, “The reasonable doubt rule and the meaning of innocence”, 1989, 40 *Hastings Law Journal* 457; F. Bates, “Describing the indescribable—evaluating the standard of proof in criminal cases”, 1989, *Crim. L.J.* 330; C.R. Nesson, “The evidence or the event? On judicial proof and acceptability of verdicts”, (1983) 98 *Harvard L Rev.*, 1357; L. Tribe, “Trial by mathematics: precision and ritual in the legal process”, (1971) 84 *Harvard L Rev.* 1329.

¹⁶ L.H. Hoffman and D.T. Zeffert, *The South African Law of Evidence*, 4th edn., 1992, 525.

¹⁷ W. Twining, “Debating probabilities”, (1980) 2 *The Liverpool Law Review* 51.

¹⁸ The *Oxford English Dictionary* defines it as “the quality of fact of being probable: the appearance of truth, or likelihood of being realized, which any statement or event bears in the light of present evidence; likelihood”. *Webster’s Dictionary of Mathematics* (1989) defines it as “informally, a numerical value of the ‘chance’ of occurrence of one of several possible outcomes of an unpredictable event”. It then goes on to give the usual calculations concerning dice, black and white balls, and the like. *The Oxford Concise Science Dictionary* (1984) states it is “The likelihood of a particular event occurring.” *The Dictionary of Science* (1986) gives a similar definition: “A mathematical expression of the chance that a specified event will occur.” *The Harper Encyclopaedia of Science* (1967) explains “the meaning of ‘probability’” by saying that a partial clarification is that probability may be construed as “the degree of the lawful association of properties, or, as the coefficient of reliability with which one property signifies another”. However, it also states that there are important uses of the term in the literature that are dissimilar to the meaning given by it. Some writers have construed probability as a logical relation, and other authors have construed probability as a measure of psychological confidence. *The Concise Encyclopaedia of Science and Technology* (2nd edn.), 1989, as a preliminary to an exposition in mathematical logic, states, “Probability theory constructs abstract models, mostly of a qualitative nature, and only experience can show whether these reasonably describe laws of nature or of life. As always in mathematics, only logical relations and implications enter the theory, and the notion of probability is just as undefinable (and as intuitive) as are the [notions] of point, line or mass.”

¹⁹ W. Twining, above n. 17, 51.

²⁰ A.P.A. Broeders, “Enige Overwegingen bij het Gebruik van arsjijnlijkheidsconclusies in het Forensisch Onderzoek”, (1999) 29 *DD* 389.

²¹ W. Twining above n. 17, 51, distinguishes four different theories of probability. The first theory is the so-called *classical doctrine of chances*, which can only apply where all outcomes are equiprobable as in estimating probabilities of particular, e.g. throws with an unweighted dice. *Statistical* or *actuarial* probabilities are based on determinations of relative frequency within a given class. The third

Experts testifying in court are likely to express their conclusions either in verbal or numerical terms in respect of the probabilities of tests conducted by them.

The process of fact-finding is a notoriously difficult one. Certain kinds of evidence are so complex that they pose extreme problems to lay decision-makers.²² As indicated above, the ultimate finder of fact is, in the context of expert evidence, often in uncharted waters filled with uncertainties and probabilities. It must be acknowledged that the judiciary must be aware of the Scylla and Charybdis of expert evidence in order to reduce the occurrence of error and to enhance accuracy.

EDUCATING FACT-FINDERS

Faigman observes that the “scientific sea” is very wide and deep²³ and that judges should at least know how to swim, i.e. “have the basic skills necessary to read and understand scientific methods and to integrate scientific knowledge in their legal decisions, without actually having to make the swim across the entire breadth of science.”²⁴ To elaborate on both the imagery used by Faigman and his recommendation, it is suggested that all parties to the criminal justice process should grasp the nature of expert evidence before taking to the waters of expertise.

South Africa is in the privileged position that its presiding officers are professionally educated judges and magistrates, a fact which enhances the scope for educating fact-finders in the skills of understanding and evaluating expert evidence.

Legal education in respect of expert evidence in general and different fields of evidence in particular can contribute to making the judicial waters more navigable. It is an understanding of the nature of expert evidence and particularly scientific knowledge that informs the way in which the legal process responds to this kind of evidence.

All role-players in the criminal justice process should have an understanding of what qualifies as scientific knowledge. An overview of the different perspectives of science shows that there is a growing tendency to view facts, also so-called scientific facts, as relative and socially constructed. This is a move away from the traditional view that scientific method can lead to the discovery of absolute truths about phenomena. Knowledge of the different theories, as well as the way in which the law views science, is crucial to participants in the legal process when scientific evidence is introduced. The myth of the existence of autonomous, unambiguous and objective scientific truths must be dispelled.

category of probability judgements can be found in subjective expressions of *degrees of confidence* in some particular proposition, such as “I think there is a likelihood of rain today.” As Twining explains, these kinds of judgements may be “based to a greater or lesser extent on evidence or experience or argument or intuition or irrational beliefs or pure guesswork or a combination of such factors”. The subjective probabilities may be Pascalian, i.e. expressed in mathematical terms, but need not be. In the fourth instance there are *inductive* or *Baconian* probabilities, encompassing judgements of probability based on reasoning which in *principle* is *non-mathematical*. Baconian probabilities are according to Cohen, *The Probable and the Provable*, 1977, judgements which are based on rational arguments and based on weight or cogency of evidence supporting a particular hypothesis (54).

²² I. Freckelton, P. Reddy and H. Selby, *Australian Judicial Perspectives in Expert Evidence: an Empirical Study*, 1999, 38.

²³ D.L. Faigman, “Mapping the labyrinth of scientific evidence”, (1995) 46 *Hastings Law Journal* 579.

²⁴ *Ibid.*

FACTORS IMPACTING ON THE ASSESSMENT OF EXPERT EVIDENCE

This section is concerned with putting forward certain guidelines that can assist judges and assessors in the process of assessing expert evidence and ascribing weight to such evidence.

Consideration of solutions to problems associated with expert evidence needs to have regard to the reason for introducing expert evidence, in the first instance, which is to assist the trier of fact on matters that go beyond the scope of common knowledge, or could be helpful to the court in deciding the issue.

The fact that the cardinal duty of the expert is to the court has been reiterated on many occasions and emphasized recently in *S v. Huma* (2):²⁵

“the value of an expert is not to espouse and further the cause of a particular party, but to assist the Court in coming to a proper decision on technical and scientific matters. It should therefore at all times be remembered that an expert is primarily there to assist the Court and not necessarily to further the cause of his particular client to such an extent that he loses objectivity and in fact undermines his client’s case.”²⁶

This approach makes it clear that despite the general adversarial tradition followed in South Africa, an expert owes allegiance to the court and not to the party on whose behalf he has been called. Increased specialization means that more and more areas are potentially beyond the grasp of the average generalist judge, consequently creating a need for expert assistance in these areas. Many areas related to human behaviour traditionally considered to be within the competence of decision-makers, should now be considered areas in which expert evidence should be received. “Assistance to the court” is the “golden thread” running through the recommendations made here.

The strength of the chain of laboratory processing

Research indicates that the context of expert evidence requiring laboratory processing, the interconnection of the different steps associated with the evidence and potential errors made during the pre-trial stage can affect the probative value of the evidence in question. Investigating how expert evidence is usually developed in the pre-trial stage can focus legal decision-makers’ attention on the fact that errors occurring in the pre-trial stage can cause weak links in the chain of expert evidence.

From an overview of both adversarial and inquisitorial jurisdictions²⁷ certain problems emerged:

- (i) sample/trace contamination
- (ii) unlawful sample collection
- (iii) deliberate misrepresentation of results
- (iv) fabrication of results
- (v) deceptive misreporting of results
- (vi) honest but erroneous interpretation of results
- (vii) biased interpretation of results

²⁵ 1995 1 SACR 409 (W).

²⁶ *Ibid.*, 410 h–i.

²⁷ L. Meintjes-van der Walt, *Expert Evidence in the Criminal Justice Process: A Comparative Analysis*, 2001, ch. 5.

- (viii) disinclination to disclose results favourable to the other party
- (ix) inadequately qualified examiners
- (x) inadequately validated procedures and protocols
- (xi) improper preparation of laboratory reports
- (xii) insufficient documentation of results

Having identified the potential problems that are often inherent in multiple step laboratory procedures and institutional bias of testing laboratories, ways in which the evidentiary chain can be strengthened are explored.

As a solution to scientific and laboratory malpractices and inadequacies, a uniform code of protocols and standards complying with international standards can be considered.²⁸ Appropriate training can enhance the performance both of crime scene investigators and laboratory personnel. With regard to scientists, accreditation to quality management systems²⁹ could ensure that forensic scientists subscribe to uniform protocols and standards. In addition, a code of conduct to which all experts should subscribe is suggested to overcome issues related to partisanship by reminding experts that their paramount duty is to assist the court and not the parties.

Disclosure

While prosecution disclosure of expert evidence is a phenomenon that is firmly supported in most adversarial jurisdictions,³⁰ the notion of defence disclosure still remains controversial. In South Africa the defence has no obligation to assist the prosecution and is entitled to assume a purely adversarial role towards the State. Based on the rationale of expert evidence being an auxiliary to the presiding officer, I should like to argue for reciprocal disclosure *in the field of expert evidence*.³¹ Failure to make reciprocal disclosure of expert evidence could militate against expert evidence that educates and could have the effect of obfuscating the expertise.

It is submitted that such disclosure will not infringe an accused person's constitutionally guaranteed right to remain silent and the right not to be forced into self-incrimination. As disclosure of expert evidence that is to be introduced at trial will be evidence that is likely to be in favour of the accused, such expedited disclosure is unlikely to be self-incriminating. The only advantage that the defence is likely to lose is the tactical element of surprise which is associated with trial by ambush. Where complex defence expertise is sprung on the

²⁸ J.F. Nijboer and W.J.J.M. Sprangers (eds.), *Harmonisation in Forensic Expertise: An Inquiry into the Desirability and Opportunities of International Standards*, 2000.

²⁹ In England and Wales, systems recognized by the National Measurement Accreditation Service (NAMAS) and the British Standard ISO 9000 are in operation. See C. Walker and R. Stockdale, "Forensic evidence", in S. Walker and K. Starmer, (eds.), *Miscarriages of Justice: A Review of Justice in Error*, 1999, 111.

³⁰ The traditional arguments in favour of prosecution disclosure are, *inter alia*, that (i) prosecution disclosure is a means of achieving equality of arms; (ii) adequate facilities for the preparation of a defence must be taken to include the necessary information to undertake that preparation; (iii) in order to be able to obtain the attendance of witnesses to assist its case, the defence needs to know of their existence and the evidence which they can give; (iv) absence of prosecution disclosure is likely to lead to miscarriages of justice; (v) prosecution disclosure assists in the search for truth as it involves scrutiny of the investigatory process.

³¹ The argument here is confined to disclosure of expert evidence. Full defence disclosure falls outside the scope of this topic.

prosecution, the effect would be that such evidence is either not adequately challenged or where an adjournment is requested, valuable court time is expended. It is suggested that the pre-trial phase can play an important role in clarifying issues and trial preparation.

Pre-trial expert meetings

The efficacy of the adversarial trial process in eliciting the truth in such a way as to be of assistance to the trier of fact has often been called into question. Pre-trial meetings between experts could contribute to consensus-delineating, leaving only disputed issues for trial.

In order to enhance dissemination of information amongst all the role-players, it is essential that the expert reports that are disclosed should be as comprehensive as possible and comply with a code of ethics.

Expertise

As in English, so also in South African law the requirement of expertise does not mean that the witness needs to be professionally trained in the particular area, neither does it mean that the fact that the witness is a professional, necessarily qualifies him/her as an expert.³² The latter instance is concisely stated by Addleson, J., in *Menday v. Protea Assurance Co (Pty) Ltd.*:³³

“However eminent an expert may be in a general field, he does not constitute an expert in a particular sphere unless by special study or experience he is qualified to express an opinion on that topic. The danger of holding otherwise—of being overawed by a recital of degrees and diplomas—are obvious; the Court has then no way of being satisfied that it is not being blinded by pure “theory” untested by knowledge or practice. The expert must either himself have knowledge or experience in the special field on which he testifies (whatever general knowledge he may also have in pure theory) or he must rely on knowledge or experience of experts other than themselves who are shown to be acceptable experts in that field.”

The application of the common law “Field of Expertise” rule in South Africa has focused on the skill, experience and training of the particular expert. Court experts are accordingly required to indicate that they have been trained in a particular discipline or have gained experience in a particular field. Court *dicta* are usually silent on which particular fields or areas of expertise and skill would qualify a witness as an expert.

In the past, when court experts came from widely accepted fields of knowledge, such an enquiry would have been superfluous. However, in the rapidly developing world of science and technology, new and novel theories and techniques are constantly emerging. This area between the acknowledged accepted fields of expertise and cutting-edge experimentation has been aptly referred to as the

³² See *Wigmore on Evidence*, 1988, Vol. 2, 750: “The object is to be sure that the question to the witness will be answered by a person who is fitted to answer it. His fitness, then, is a fitness to answer on that point. He may be fitted to answer about countless other matters, but that does not justify accepting his views on the matter in hand. Since experiential capacity is always relative to the matter in hand, the witness may, from question to question, enter or leave the class of persons fitted to answer, and the distinction depends on the kind of subject primarily, not on the kind of person.” In *Mohamed v. Shaik* 1978 4 SA 523 (N) the court held that a general medical practitioner, even though he held the degrees MB ChB and had four years’ experience, was not qualified to speak authoritatively on the significance of findings in a pathologist’s report concerning the fertility of semen.

³³ 1976 1 SA 565 (ECD).

“twilight zone” of expertise.³⁴ Here again, judges need to make an informed decision whether the evidence has fully “emerged from the experimental to the demonstrable”.³⁵ In *R v. Trupedo*³⁶ and *S v. Shabalala*,³⁷ both dealing with the behaviour of tracking dogs, it was held that such evidence has not yet been removed from the realm of conjecture and so qualifies it for promotion to the status of admissibility.³⁸

It can be expected that with the rapid development of new scientific, technical and social scientific techniques and procedures, South African judges will increasingly be confronted with the challenge of developing criteria and standards by which to determine whether these novel kinds of expert evidence are admissible and reliable. Most probably, the practice will continue to admit such evidence, but it would be left to the tribunal of fact to determine the value and weight. In this regard, South African judges can profitably borrow from the guidelines set out in the American case of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*³⁹ To this I shall return later.

Clarity of presentation

If the primary objective of expert evidence is to assist the court, then it follows logically that every attempt should be made, systemically and otherwise, to fulfil this purpose. This can only be achieved if the expert evidence is introduced to the criminal justice process in such a way as to optimally achieve this primary goal. Expert evidence can only be of assistance where it is presented in such a way as to illustrate the expert’s evidence and not obfuscate his information. It is only when the expert succeeds in educating the trier of fact in respect of his (the expert’s) particular field of expertise to a sufficient degree, that the court will be in a position to apply the expertise to the fair adjudication of the issues in dispute.

A comparative analysis⁴⁰ of expert evidence in South Africa, the Netherlands and England/Wales reveals that while all three jurisdictions, to varying degrees, use oral and documentary expert evidence, expert reports fulfil a valuable function in all three jurisdictions. Expert reports play an important role during pre-trial proceedings in facilitating adequate disclosure of information and contributing to the identification of the issues in dispute. The expert report contains the evidence upon which the tribunal of fact must, in conjunction with other evidence, make its ultimate decision. I am of the view that when the defence is in possession of a written version of the oral evidence to be given by experts in complex contested cases, a copy should also be handed to the judge and assessor(s). A report of such significance must also comply with certain requirements, some apparently contradictory: it must be “intelligible without oversimplification, comprehensive without irrelevance and succinct without material omission”.⁴¹ There is also a growing awareness of the need of experts

³⁴ *Frye v. United States* 293 F1013 (1923).

³⁵ *Ibid.*

³⁶ 1920 AD 58.

³⁷ 1986 4 SA 734 (A).

³⁸ *Ibid.*

³⁹ 113 S Ct 2786 (1993).

⁴⁰ L. Meintjes-Van der Walt, *Expert Evidence in the Criminal Justice Process: A Comparative Analysis*, 2001, ch. 6.

⁴¹ L. Roberts, “Science in the criminal process”, *Oxford Journal of Legal Studies*, 484.

to “educate”⁴² decision-makers in respect of their field of expertise to the degree that it is relevant to the issues before the court.

It is also indicated that in the adversarial tradition where evidence is party-introduced, there is the need that the parties should be educated by the expert in order that they may present expert evidence in such a manner as to assist the court in the search for justice. It is suggested that adequate exchange of information is a pre-condition for the achievement of this objective.

Logical consistency

Without logical coherence no theory can command validity. In addition, an hypothesis that is self-contradictory is logically ill-informed and cannot be tested.

The theory on which the expert bases his evidence must, therefore, exhibit internal consistency and logic. The premises of the theory, along with the observations and data, must lead to conclusions through logically valid reasoning. A possible problem that may be encountered is that scientific evidence is often expressed in mathematical terms that are counter-intuitive and cannot necessarily be understood by using ordinary decision-making processes. This means that expert evidence expressed in mathematical terms that appear counter-intuitive must be explained to the court in a way that shows logical consistency in order for the court to rely safely on such evidence.⁴³ It is therefore essential for the expert to explain the basis of his opinion.⁴⁴

The principle of parsimony⁴⁵ is justified, according to Popper, on the grounds that simple statements have greater empirical content and are better testable than more complex ones.⁴⁶ The way in which complex expert evidence is conveyed to the tribunal of fact plays an important role in the ultimate weight attached to the evidence.⁴⁷ In an Australian survey,⁴⁸ in which judges were asked what they considered to be the single most persuasive factor when an expert is giving evidence, 52 per cent identified “clarity of explanation”. Little weight was given to witness appearance, prior experience as a witness and educational qualifications and publications.⁴⁹ Broad generalizations are far more difficult to corroborate than precise statements and have little explanatory power.⁵⁰ Especially where there is a challenge to the conclusions, the expert must be in a position

⁴² G.J. Imwinkelried, “The next step in conceptualising the presentation of expert evidence as education: the case for didactic trial procedures”, (1997) 1 *E & P* 128.

⁴³ *S v. Blom* 1992 1 SASV (OK) 65f; *S v. Van As* 1991 2 SASV 74 (W) 106c.

⁴⁴ *S v. Adams* 1983 2 SA 577 (A).

⁴⁵ S. Bynum et al., *Dictionary of the History of Science*, 1981, 386 (simplicity).

⁴⁶ K. Popper, *The Logic of Scientific Discovery*, 1992, 140–142.

⁴⁷ This is borne out by recent empirical studies. Juror research in the United States of America suggests that jurors are more influenced by an expert’s ability to convey technical information comprehensively and to draw firm conclusions from the data than by educational credentials. Champagne, Shumann and Whitaker “Empirical examination of the use of expert witnesses in American courts”, (1991), 31 *Jurimetrics Journal* 388.

⁴⁸ I. Freckelton, P. Reddy and H. Selby, above n. 22, 48.

⁴⁹ *Ibid.*

⁵⁰ B. Black et al., “Science and the law in the wake of *Daubert*: a new search for scientific knowledge”, (1994), 72 *Tex L Rev* 755–756. See also *S v. Baleka* (3) 1986 4, SA 1005 (T): “The opinion of an expert is only of assistance to the Court where it is properly motivated and given with sufficient detail to enable the Court to evaluate it. Where an expert for one party has placed before the Court detailed evidence, as Dr. Jansen has done in respect of each tape recording in reports ABD 4, ABD 5 and ABD 6, consisting of some 44 pages on which he was cross-examined for days, it is not adequate for the other party’s expert to fall back on mere generalisation and merely confirm what was put by counsel in cross-examination. In that way the expert does not put his evidence across in his own words *viva voce*, but hides behind the words of counsel.” (1021C–D).

to give detailed reasons for his conclusions and an accurate account of the investigations that he carried out for the purpose of arriving at his conclusions.⁵¹ The ability of an expert to explain and clarify relationships, results and conclusions can greatly contribute to the evaluation of such evidence.

The basis rule

An expert opinion without reasons for a conclusion can have negligible probative value. Experts are expected to state the facts or data upon which their opinions are based.⁵² In *Coopers (South Africa) (Pty) Ltd. v. Deutsche Gesellschaft für Schädlingsbekämpfung Mbh*⁵³ it was said:

“[A]n expert’s opinion represents his reasoned conclusion based on certain facts or data, which are either common cause, or established by his own evidence or that of some other witness. Except possibly where it is not controverted, an expert’s bold statement of his opinion is not of any real assistance. Proper evaluation of the opinion can only be undertaken if the process of reasoning which led to the conclusion, including the premises from which the reasoning proceeds, are disclosed by the expert.”⁵⁴

Where expert opinion evidence is given when not all its bases have been proved, the rule is that such basis material must be proved by admissible evidence.⁵⁵ An expert testifying on information that has been supplied to him/her could however be the thin end of the wedge by which certain inadmissible material (which would not otherwise have been introduced) is brought to the attention of the tribunal of fact. Schuller⁵⁶ raises the additional danger that hearsay transmitted by an expert, as opposed to a lay witness, may carry persuasive weight:

“The oft-expressed concern that expert testimony will be over-valued by the jurors because of its aura of scientific reliability and trustworthiness” (see Vidmar & Schuller, 1989) suggests that hearsay conveyed via an expert, as opposed to a non-expert witness, may carry greater weight. The ‘paramessage’ elements, such as prestige and expertise, that accompany the expert’s ‘message’ (Rosental, 1993) may lend greater credibility to the hearsay information.”

Comparative significance

The third criterion put forward by Popper and quoted in the *Daubert’s* case, is that a theory should be compared with other theories. An expert witness should, where possible, give reasons why he subscribes to the particular theory or technique and how this differs from other approaches that have not been followed. The theory’s consistency with other accepted theories may also be relevant.⁵⁷ As scientific knowledge tends to be cumulative and progressive, a hypothesis that is not consistent with accepted theories should be regarded with

⁵¹ *S v. Ramgobin* 1986 4 SA 117 (N).

⁵² *Coopers (South Africa) (Pty) Ltd v. Deutsche Gesellschaft für Schädlingsbekämpfung Mbh* 1976 3 SA 352 (A); *R v. Jacobs* 1940 TPD 142 at 146. See also *R v. Morela* 1947 3 SA 147 (A); *S v. Mthize and Others* 1999 1 SACR 256 (WLD); *S v. Mokgiba* 1999 1 SACR 534 (OPD).

⁵³ 1976 3 SA 352 (A).

⁵⁴ *Ibid.* 371.

⁵⁵ In *R v. Turner* [1975] 1 QB 834 Lawton, L.J., succinctly explained the English law position to be the following: “It is not for this court to instruct psychiatrists how to draft their reports, but those who call psychiatrists as witnesses should remember that the facts upon which they base their opinions must be proved by admissible evidence. This elementary principle is frequently overlooked.”

⁵⁶ R.A. Schuller, “Expert evidence and hearsay”, (1995) 19 *Law and Human Behavior* 345.

⁵⁷ B. Black et al., above n. 50.

caution.⁵⁸ The rejection of what is accepted should require a clear alternative explanation and adequate empirical support.

In the case of social science, in particular, the value of the expert evidence will to a large degree depend on the comparative significance of the results. Not only are comparison groups important,⁵⁹ but the statistical significance of the differences measured need also be determined.⁶⁰ Faigman explains with regard to social science research evidence that “[b]ecause observed differences between groups could be a function of chance fluctuations, the statistical question remains whether observed differences vary enough to be fairly attributed to the variable being tested.”⁶¹

Courts need to become aware of the fact that scientific evidence that involves statistical reasoning must be submitted with some measure of statistical significance in order to be scientifically valid. The naked evidence of a match can mean that the DNA sample is consistent with the accused’s DNA, but it may also be consistent with the DNA of others. Without some estimate of the frequency with which the match may have occurred randomly, the occurrence of the match is of little assistance to the triers of fact in deciding the case. Judicial proficiency with even basic statistical concepts could resolve much confusion.

Explanatory power

The second requirement put forward by Popper relates to the way in which a proposition is put across. Foster and Huber⁶² remark:

“How a proposition is framed says much about how solid or slippery it really is. This is true in science as it is in ordinary discourse. Whether they come from children, politicians, judges, or scientists, plain, definite and straightforward statements are more likely to be strong and sound than verbal circumlocutions, simply because plain lies and errors are so much easier to detect and knock down.”

Partisan or pedestal presentation

Apart from the clarity of presentation, another problem that surfaces in the field of expert evidence is the potential of expert bias. Roberts⁶³ observes that the adversarial system of criminal justice poses numerous challenges to an expert’s aspirations of impartiality. Elsewhere the author of this article has investigated the viability of neutral experts and expert assessors.⁶⁴

As the introduction of neutral experts and expert assessors is unlikely to meet with approval in the South African legal culture, alternative suggestions can ameliorate current systemic inadequacies. As already indicated, greater pre-trial disclosure⁶⁵ and a meeting of experts could delineate points of consensus leaving areas of conflict to be attended to at trial.⁶⁶ This could save valuable court time and resources and restrict aimless so-called fishing expeditions in the quest to invalidate expert testimony. In many instances pre-trial conferences can eliminate

⁵⁸ Ibid.

⁵⁹ D.L. Faigman, above n. 26, 1060–1061.

⁶⁰ Ibid, 1061–1062.

⁶¹ Ibid, 1061.

⁶² *Judging Science: Scientific Knowledge and the Federal Court*, 1977, 71.

⁶³ P. Roberts, “Science in the criminal justice process”, (1994) 14 *Oxford Journal of Legal Studies* 501.

⁶⁴ L. Meintjes-Van der Walt, *Expert Evidence in the Criminal Process: A Comparative Process*, 2001, ch. 6.

⁶⁵ See s. 4.2 above.

⁶⁶ See s. 4.3 above.

the need for hearing expert evidence altogether. The success of pre-trial conferences will, however, depend on timeous defence access to comprehensive prosecution expert reports and access to own experts. Even where expert witnesses testify orally in court, comprehensive explanatory reports⁶⁷ can be of assistance in projecting a proper picture of the evidence at stake. Such a report compiled by an expert who subscribes to a Code of Ethics will not only assist the defence in challenging the prosecution's expert evidence, but will also contribute to conveying expert information to the court, thereby fulfilling the very *raison d'être* of expert evidence, namely that of being of assistance to the court.

Code of Ethics

It is recommended that experts should subscribe to and adhere to a code of ethics which will not only contribute to diminishing partisanship, but could also contribute to the reliability of the expert opinion so given.

The introduction of such a code could follow the trend initiated in England/Wales in civil cases and found in the Australian Federal Court Guidelines pertaining to all experts. These duties and responsibilities of experts were succinctly set out in *The "Ikarian Reefer"* case:⁶⁸

- “1. Expert evidence presented to the Court should be, and should be seen to be, the independent product of the expert uninfluenced as to form or content by the exigencies of litigation.⁶⁹
2. An expert witness should provide independent assistance to the Court by way of objective unbiased opinion in relation to matters within his expertise.⁷⁰ An expert witness in the High Court should never assume the role of an advocate.
3. An expert witness should state the facts or assumption upon which his conclusion is based. He should not omit to consider material facts which could detract from his concluded opinion.
4. An expert witness should make it clear when a particular question or issue falls outside his expertise.
5. If an expert's opinion is not properly researched because he considers that insufficient data is available, then this must be stated with an indication that the opinion is no more than a provisional one. In cases where an expert witness who has prepared a report could not assert that the report contained the truth, the whole truth and nothing but the truth without some qualification, the qualification should be stated in the report.⁷¹
6. If, after exchange of reports, an expert witness changes his view on a material matter having read the other side's expert's report or for any other reason, such change of view should be communicated (through legal

⁶⁷ See s. 4.5 above.

⁶⁸ *National Justice Cia Naviera SA v. Prudential Assurance Co Ltd, The Ikarian Reefer* [1993] 2 Lloyd's Rep 48 at 81–82.

⁶⁹ *Whitehouse v. Jordan* [1981] 1 All ER 267 at 276; [1981] 1 WLR 246 at 256–257 per Lord Wilberforce.

⁷⁰ See *Polivite Ltd v. Commercial Union Assurance Co Plc* [1987] 1 Lloyd's Rep 379 at 386 per GARLAND, J., and *Re J* [1991] FCR 193 per CAZALET, J.

⁷¹ *Derby & Co Ltd v. Weldon* (1990) *Times*, 9 November, per STAUGHTON, L.J.

representatives) to the other side without delay and where appropriate to the Court.⁷²

7. Where expert evidence refers to photographs, plans, calculations, analyses, measurements, survey reports or other similar documents, they must be provided to the opposite party at the same time as the exchange of reports.”

Lord Woolf argued that articulation of such responsibilities and duties would be welcomed by experts as a recognition of their role as “advisers to the court rather than advocates of the parties”.⁷³

The Academy of Experts in England and the “Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia”,⁷⁴ 1998, in essence recognize three founding principles, viz. that:

- (i) an expert witness has an overriding duty to assist the Court on matters relevant to the expert’s area of expertise;
- (ii) an expert witness is not an advocate for a party; and
- (iii) an expert witness’s paramount duty is to the Court and not to the person retaining the expert.

Cross-examination

In South Africa, as in other common law jurisdictions, cross-examination has traditionally been seen as the most effective device for testing the veracity of witnesses. Great faith is placed in the capacity of the skillful cross-examiner to expose the dishonest, mistaken or unreliable witness and to uncover inconsistency and inaccuracy in oral testimony. Cross-examination is, therefore, held to be the very essence of the right to confrontation.

The question arises whether the adversarial trial in general, and cross-examination in particular, can provide the court with a fair and balanced assessment of the strengths and weaknesses of expert evidence in a particular case. It can be questioned whether cross-examination is an appropriate safeguard for the testing of the testimonial validity in the case of expert evidence. Some reservations are held about the appropriateness of cross-examination regardless of the type of evidence that is being heard, while other arguments pertain specifically to the nature of expert evidence. It has been shown that cross-examination can often instead of revealing the truth, be truth distorting; that demeanour as a touchstone for reliability is open to question and that cross-examination is often based on the outmoded belief (genuine or as a strategy) in absolute scientific certainties.⁷⁵

⁷² *National Justice Cia Naviera SA v. Prudential Assurance Co Ltd, The Ikarian Reefer* [1993] 2 Lloyd’s Rep 68 at 81–82, which has since been applied by Stuart Smith, L.J., in *National Justice Cia Naviera SA v. Prudential Assurance Co Ltd, The Ikarian Reefer* [1995] 1 Lloyd’s Rep 455 at 496 and EVANS, L.J., in *Vernon v. Bosley (No 1)* [1997] 1 All ER 577 at p. 601. STUART-SMITH, L.J., endorsed the formulation of CRESSWELL, J., “without hesitation” on appeal but added “One word of caution in relation to par 4: That an expert should make it clear when a particular question or issue falls outside his expertise” [1995] 1 Lloyd’s Rep 455 at 496.

⁷³ Lord Woolf, *Access to Justice Final Report to the Lord Chancellor on the Civil Justice System in England and Wales*.

⁷⁴ See Freckelton et al., above n. 22.

⁷⁵ See *Jackson v. Jackson* 2000 (2) SA 303 (SCA) where the majority of the court held that the trial court’s advantage to observe witnesses while they testify should not be over-emphasized, especially where the witness is a professional person.

Despite the criticisms of cross-examination, adversarial systems, such as those of South Africa and England/Wales, are unlikely to jettison this forensic tool, especially as long as expert evidence continues to be party-induced. Access to expertise not only could influence counsel's ability to challenge expert evidence, but lack of financial means of the accused could also impact negatively on his quest to secure expert assistance. It is suggested that in order to establish whether the "interests of justice" require that legal aid could be granted, courts should consider criteria set out by the European Court of Human Rights, viz.⁷⁶ (i) the seriousness of the offence and/or the severity of the penalty and (ii) the complexity of the case.

Daubert criteria

It is suggested that the criteria in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*⁷⁷ for determining the admissibility of scientific evidence can also assist in evaluating expert evidence. It is argued that in South Africa there is no need to look towards *Daubert* for factors significant in the determination of the admissibility of expert evidence, but that similar criteria could be used as factors in evaluating the probative value of expert evidence. It is proposed that the following factors should influence expert evidence when placed on the scales of justice:

Testability

The scientific evidence must be based on a theory that is testable and refutable. Evidence from those disciplines that make assertions that are more difficult to falsify if wrong, must be considered to be less reliable. Fact-finders should determine whether the theories and techniques before the court have been subjected to enough testing to establish their reliability.

Foster and Huber⁷⁸ contend that an emphasis on falsifying theories has an additional advantage in that it helps to overcome the effects of confirmation bias. Confirmation bias is a phenomenon whereby scientists tend to settle on a theory at the outset and thereafter tend to look for data to confirm the theory, rather than trying to discredit or refute it.⁷⁹

This criterion serves to illustrate that propositions that are so loosely stated that they cannot be falsified warrant careful and cautious assessment. Certain "soft science" evidence such as handwriting analysis, psychological testing, syndrome evidence, medical and psychiatric observations, arson investigation, bite marks and evidence regarding profiling, linguistics and graphology may not

⁷⁶ Judgment of 28 March, 1990, *Granger* A 174 18–19, Judgment of 24 March, 1991, *Quaranta* A 205 17–18 referred to in Van Dijk and Van Hoof (eds.), *Theory and Practice of the European Convention on Human Rights*, 1998, 472.

⁷⁷ 133 S Ct 2786 (1993). See *Kumho Tire Co v. Carmichael* 119 S Ct 1167 (1999) where the Supreme Court of the United States held that in determining the admissibility of expert testimony based on technical or other specialized knowledge, courts should just as with scientific evidence, use the factors set out in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*

⁷⁸ Above n. 13, 44.

⁷⁹ M.J. Mahoney, *Scientist as Subject: The Psychological Imperative*, 1976, 155. This phenomenon is illustrated in a paper by Garry et al., "Memory: a river runs through it", (1994) 3 *Consciousness and Cognition* 438–451 where it is shown that mental health professionals investigating child abuse may too readily albeit unwittingly collaborate with the presumed victim to conjure up memories of abuse that never happened.

be as easy to falsify as in the case of physical science evidence for instance.⁸⁰ However, it must be borne in mind that the concept of falsifiability or testability is separate from the question of when a scientific theory can be corroborated or falsified by observations. Faigman indicates that the *status* of a statement as scientific depends on its amenability to test, while the *merit* of a scientific statement depends on the degree to which it has survived attempts at falsification.⁸¹ Those disciplines that make assertions that are more difficult to falsify if wrong are consequently potentially less reliable. To the fact-finder the key issue should be whether the theories and techniques testified to by the expert have been subjected to enough testing to establish their reliability. Where this has not been done, it should of necessity influence the weight that should be attached to such evidence. South African courts have traditionally also placed a value on the court's ability to independently "test" an expert's opinion, as was stated by RAMSBOTTOM, J., in *R v. Jacobs*⁸² "... it is of the greatest importance that the value of the opinion should be capable of being tested and unless the expert states the grounds upon which he bases his opinion, it is not possible to test its correctness so as to form a proper judgment upon it."⁸³ Where the court is not in a position to "test" the experts testimony from its own observation, the greater the imperative that if any reliance on that evidence is to be sought, the proposition should have been subjected to appropriate testing and controls⁸⁴ during the pre-trial stage. Where fact-finders are thus in no position to assess for themselves the validity of claims made by an expert, the fact that the expert's claims have been subjected to testing⁸⁵ can at least serve as some guarantee of reliability, independent of the claim of reliability by the expert himself.

Reliability

The reliability of a test or procedure that forms the basis of the evidence also needs to be scrutinized. A reliable test is one that can be repeated under identical circumstances and produce the same results. Fact-finders should, however, not be blinded by test results that are shown to be reliable, as results can be reliable but not valid. There are two factors that can influence the reliability of an observation made by an expert. These factors include the reliability of the observational tools and skills used by the expert and the underlying probability of the observation. As indicated, the existence, maintenance and adherence to

⁸⁰ The so-called "hard" sciences, however, can also raise questions that might never be amenable to testing. Stephen W. Hawking discusses the physical impossibility of building a particle accelerator large enough to test grand unified theories of the universe directly. See *A Brief History of Time: from the Big Bang to Black Holes*, 1988, 14–75.

⁸¹ D.L. Faigman, "To have and have not: assessing the value of social science to the law as science and policy", (1989), 38 *Emory Law Journal* 1018; see also M.J. Saks, "The aftermath of *Daubert*: an evolving jurisprudence of expert evidence", (2000), 40 *Jurimetrics*, 236.

⁸² 1940 TPD 142, 146.

⁸³ See *S v. Mkhabela* 1984 1 SA 556 (A); *S v. Nala* 1965 4 SA 360 (A); *S v. Nksatlala* 1960 3 SA 543 (A); *S v. Blom* 1992 1 SASV 649 (OK); *S v. Mkhize* 1999 1 SACR 256 (WLD) and *Coopers (South Africa) (Pty) Ltd v. Deutsche Gesellschaft für Schädlingsbekämpfung MbH* 1976 3 SA 352 (A).

⁸⁴ Without controls, the cause of an outcome cannot be determined. See R.N. Jonakait, "The meaning of *Daubert* and what that means for forensic science", (1994), 15 *Cardozo Law Review*, 2107–2110. Faigman specifically emphasizes the importance of control or comparison groups to social science research evidence. He maintains that when researchers study the effect some variable has on behaviour, the use of control groups can serve to give credence to the inference that a specific variable has the effect on the outcome measure. See Faigman, above n. 80, 1060.

⁸⁵ Evidence based on empirical testing performed by the expert himself is likely to carry more weight than mere theoretical possibilities. *S v. Van As* 1991 2 SASV 74(W).

standards and protocols can enhance the reliability of the technique before court. Likewise, the competency and skill of the specific examiner, and the general acceptance of the specific scientific technique used by others in that field can also be an important indicator of reliability.

Validity

While an instrument or technique can accurately measure something and therefore be reliable, the reliability does not necessarily guarantee the validity of the conclusions. It is, therefore, pointed out that legal decision-makers should not be blind to the distinction between a valid method and the valid use of that method in a case for adjudication. Logical consistency, explanatory power, comparative significance, peer review and publication can all contribute to the validity of the evidence proffered.

Techniques and theories used by forensic scientists can therefore be verified by publication of the technique or theory in a scientific journal after having been reviewed by peers. Reputable scientific journals subject papers to peer review so that even before a paper is published other scientists in the field have checked the material for obvious flaws. Once published, flaws in a theory or technique are likely to become apparent through attempts at replication by other scientists.⁸⁶ Peer review and publication are ways in which fact-finders can determine whether techniques and theories have been verified.

However, the results of tests conducted by a forensic scientist in an individual case cannot be verified by the requirement for publication or peer review. One way of verifying the data would be to allow independent testing by the defence or the court. Where this is not done, the fact-finder must bear this fact in mind, especially in the light of the possible error rate concerning the given forensic procedure.

Known or potential error rate

Judicial decision-makers need to be aware of the fact that a technique with an unknown error rate is a technique that is not likely to have been tested adequately.⁸⁷ It is suggested that the general acceptance of the method or technique in the specific field of expertise is likely to give a reliable indication of the error rate of the specific procedure. Even where the technique in general is widely accepted, decision-makers should ascertain whether the correct procedures and protocols had been followed in the case before court.

The evidence as a whole

It is trite law that a court is not bound by expert evidence.⁸⁸ It is the court that ultimately assesses the cogency of the expert's evidence "in the contextual

⁸⁶ The *Daubert* court recognized "the scrutiny of the scientific community ... increases the likelihood that substantive flaws in methodology will be detected", above n. 61, 2797. Jonakait observes that forensic scientists generally operate outside the peer review system and are therefore not exposed to the same "institutional scepticism" of ordinary science. "Forensic Science: the need for regulation", (1991) 4 *Harv. J. L. & Tech.* 133.

⁸⁷ Jonakait, above n. 83, 446.

⁸⁸ In *S v. Lewis* 1986 (2) PH 1196 (A) however, the Appellate Division (as the Supreme Court of Appeal was then known) held that if a court does not follow recommendations contained in a probation officer's report, reasons should be given.

matrix of the case with which he is seized".⁸⁹ In *S v. Van der Meyden*⁹⁰ it was stated that "[a] court does not look at the evidence implicating the accused in isolation in order to determine where there is proof beyond reasonable doubt, and so too does it not look at the exculpatory evidence in isolation in order to determine whether it is reasonably possible that it might be true."

From South African case law there does not appear to be a hard and fast rule with regard to the cogency of the expert evidence that is presented. Whether the evidence had been challenged seems to be a factor, and absence of a challenge by the defence could cause *prima facie* proof to become conclusive proof.⁹¹ In trials where expert evidence has been introduced, judicial fact-finders are challenged to find means of assessing the inferential force or weight of all the evidence before it.

Judicial decision-makers often use a story-based approach to organize and interpret evidence during the course of the trial.⁹² Writers on the legal process from a wide range of theoretical perspectives are in agreement on the importance of narrative coherence in fact-finding.⁹³ It must further be borne in mind that facts and opinions testified to by expert witnesses do not speak for themselves.⁹⁴ It is lawyers and experts who can make the evidence speak by giving it a narrative structure based on certain shared assumptions of logic. Fact-finders, whether persuaded by the narrative or not, will in turn order the facts or opinions testified to according to their own narrative structure. The danger of this kind of reasoning is, however, that a preference for stories in which events are connected will lead fact-finders to see causal connections where in reality there are only coincidental correlations.

In the adversarial context, each side will endeavour to build a narrative which incorporates or can accommodate elements of the scientific evidence. Expert evidence is invariably incorporated into trial narratives as a buttress to their plausibility. Expert evidence can contribute to the narrative as a whole, whether by supplementing lay or circumstantial evidence or by deconstructing or attacking the evidence of lay and/or expert witnesses for the opposition.

In the case of certain psychological and psychiatric evidence, the opinion of the expert witness will largely be informed by facts related to him/her by the subject of the evaluation. This weakness of psychiatric evidence was alluded to in *Singh v. Parkfield Group*.⁹⁵

"It is common sense and both the psychiatrists before me agree, that particularly in matters of psychiatry the accuracy and honesty of the patient is all important. Clearly in this case, my own assessment of the plaintiff is, therefore, crucial."

⁸⁹ *S v. M* 1991 1 SACR 91 (T) 100a. See also *Legote* 2001 (2) SACR 179 (HHA).

⁹⁰ 1999 (1) SACR 447 (WLD).

⁹¹ *S v. Mthimkulu* 1975 (4) SA 759 (A) 765 A–B; *Nelson v. Marich* 1952 (3) SA 140 (D) 149A–B; *S v. Mkhize* 1998 (2) SACR 478 (WLD); *Pezzutto v. Dreyer* 1992 (3) SA 379 (A).

⁹² N. Pennington and R. Hastie, "A theory of explanation-based decision-making" in G. Klein and J. Orasanu (eds.), *Decision-making in Complex Worlds*, 1991; S.D. Jackson and S. Doran, *Judge without Jury*, 1995, 217–222.

⁹³ N. MacCormick, *Legal Reasoning and Legal Theory*, 1978, 86–93; W. Twining, *Rethinking Evidence*, 1994, ch. 7; B.S. Jackson, *Law, Fact and Narrative Coherence*, 1988.

⁹⁴ This notion that facts possess no intrinsic meaning without some assumptions or framework in which to incorporate them has long been acknowledged by historians. See R.G. Collingwood, *The Nature of History*, 1946, 2492; K. Jenkins, *Re-thinking History*, 1991, 32–36; H. White, *The Content of Form: Narrative Discourse and Historical Representation*, 1987.

⁹⁵ *Lexis*, 10 July, 1991.

Where the subject is discredited, the testimony of the expert witnesses who have relied on what the subject had told them, would be of no value.⁹⁶ In the context of some types of expert evidence, where issues such as the probability that forensic evidence from the scene of the crime matches that found on the accused, the story model may flounder. Judicial decision-makers may find it difficult to use stories to compare the credibility of the defence case to a DNA statistic. In the realm of probabilistic⁹⁷ evidence expressed in numerical terms, fact-finders may need to look towards other strategies to assist them.

THINKING ERRORS

In the instance of ordinary eyewitnesses' testimony, conclusions are made about the observation of the witness and on the strength of that observation the existence of the fact observed is concluded.⁹⁸ In the context of forensic science evidence experts routinely attest to "matches". When evaluating such "match" evidence, Koehler⁹⁹ observes that many lawyers and researchers assume that the evidence given by an expert is conclusive proof of "a match between the suspect and crime sample". He explains that a more accurate description of the evidence would be "a *report* of a match between the suspect and crime sample".¹⁰⁰

Where certain points of similarity are found between two items of evidence as in the case of fingerprints found at the scene of a robbery and those of the accused, the relevance of finding seven points of similarity is meaningless if it is not given in conjunction with evidence that two fingerprints with seven points of similarity have never been made by different persons. Other "match" or associative evidence is sometimes accompanied by statistical testimony about the incidence rate of the "matching" characteristic.¹⁰¹ In both examples, for proper evaluation of such evidence, the fact-finder needs background information on the "incidence rate" of finding such matching characteristics.

Expert evidence should not be judged in isolation. Fact-finders may be overwhelmed by statistical evidence and overawed as to how to give such evidence appropriate weight. Where match evidence is expressed in likelihood ratios, legal decision-makers must be alert to the fact that likelihood ratios grade the probative value of the evidence in the light of the hypothesis being considered and do not indicate whether the accused committed the crime or not. There have been many proposals on how to deal with these problems.¹⁰² Judicial decision-makers should be made alive to them.

⁹⁶ See *S v. Shizute* 1991 1 SACR 656 (NM) for the general principle that opinion evidence must be supported by credible evidence and be related to the facts of the case being considered (662e).

⁹⁷ It has been said that all evidence is probabilistic in that it can never establish a proposition with certainty. In this context, probabilistic is used to refer to testimony couched in numerical terms.

⁹⁸ O. Ekelöf, "Free evaluation of proof", (1964), *Scandinavian Studies in Law* 47.

⁹⁹ J. Koehler, "On conveying the probative value of DNA evidence: frequencies, likelihood ratios and error rates", (1996), 67 *University of Colorado Law Review* 868.

¹⁰⁰ *Ibid.*

¹⁰¹ Thompson and Schumann, "Interpretation of statistical evidence in criminal trials: the prosecutor's fallacy and the defence attorney's fallacy", (1987) 11 *Law and Human Behaviour* 168.

¹⁰² B. Robertson and G.A. Vignaux, *Interpreting Evidence*, 1995; M. Redmayne, "Doubts and burdens: DNA evidence, probability and the courts", (1995) *Criminal Law Procedure* 467, n 21; W.A. Wagenaar, "The proper seat: a Bayesian discussion of the position of the expert witness", (1988) 12 *Law and Human Behaviour* 499; M. Redmayne, "Presenting probabilities in court: the DNA experience", (1997) *E & P* 188; W.C. Thompson and E.L. Schumann, "Interpretation of statistical evidence in

EXPERT EVIDENCE ONLY?

What happens when the expert evidence is the only evidence against the accused?¹⁰³ Should such evidence be treated as circumstantial evidence¹⁰⁴ or are some kinds of expert evidence so powerful that an accused can be convicted on that evidence alone?

What is the cogency in the situation where the accused's only link to the crime is the fact that his/her profile came up in a DNA database trawl? How should judges appropriately distinguish between confirmation trawl cases?¹⁰⁵ There is a need for judicial education in order to rank and weigh this kind of evidence.

CONCLUSION

The more that complex evidence and scientific evidence continue to increase and evolve, the more courts will be faced with some of the problems alluded to here. The judicial system must ensure that the decision-makers can be assisted by the evidence presented by the litigants. If decision-makers cannot understand complex scientific evidence, they may render decisions based solely on superficial criteria rather than on substantive evaluation of the evidence.

This article sought to show that legal decision-makers can be informed by scientific method and other factors in order to evaluate expert evidence in court. The broad guidelines discussed in this presentation are not exhaustive, but can have bearing on determination of the probative value of expert evidence.

Judges could be educated about proposed areas of expertise.¹⁰⁶ Continuing education will help judges to develop new and better criteria for assessing the reliability and probative value of different types of expert testimony. Ultimately the proof of the pudding would be where justice has triumphed and everyone concerned has received their just desserts.

criminal trials: the prosecutor's fallacy and the defence attorney's fallacy". Outside the legal context this error is known as "transposing the conditional", (1987) 11 *Law and Human Behaviour* 168.

¹⁰³ An example of this would be where the only evidence linking the accused to the crime is a DNA match between him/her and the crime sample and proof that he worked in the area.

¹⁰⁴ In *S v. Mtsheni* 1985 (1) SA 590 (A) the Appellate Division found the dictum in *Caswell v. Powell Duffryn Associated Collieries Ltd* [1939] 3 All ER 722 at 733 apposite regarding inferential reasoning:

"Inference must be carefully distinguished from conjecture or speculation. There can be no inference unless there are objective facts from which to infer the other facts which it is sought to establish. In some cases the other facts can be inferred with as much practical certainty as if they had been actually observed. In other cases the inference does not go beyond reasonable probability. But if there are no positive proved facts from which the inference can be made, the method of inference fails and what is left is mere speculation or conjecture."

The assessment of guilt by inference should follow the logical guidelines set out in *R v. Blom* 1939 AD 188 202–3 viz.

"(1) The inference sought to be drawn must be consistent with all the proved facts. If it is not, the inference cannot be drawn.

(2) The proved facts should be such that they exclude every reasonable inference from them save the one sought to be drawn. If they do not exclude other reasonable inferences, then there must be a doubt whether the inference sought to be drawn is correct."

¹⁰⁵ P. Donnelly and R.D. Friedman "DNA database searches and the legal consumption of scientific evidence", (1999) 97 *Michigan Law Review* 931; D.J. Balding and P. Donnelly "Evaluating DNA profile evidence when the suspect is identified through a database search" *JFSCA* 41 No. 4, July 1996, 603–607.

¹⁰⁶ In the United States The Federal Judicial Center's *Reference Manual on Scientific Evidence* is designed "to provide judges with quick access to information on specific areas of science in a form that will be useful in dealing with disputes among experts".